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Wages and Employment in the Transition to a Market Economy

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Because of the inherited ownership structure and the uncertainties associated with reform, market regimes in reforming socialist economies will continue to need centralized controls over wages in worker-controlled firms (the socialized sector). Unemployment and an expanding private sector alone are unlikely to provide a sufficient restraining mechanism for wages.

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Certain inherited features of the socialist economies — socialized ownership, full employment, restricted job mobility, and de facto wage indexation — mean that drastic reform of the labor market must figure prominently in overall economic reform.

The question is how to implement that range of reforms to ensure compatibility. One such tension relates to the fact that governments must demonstrate their commitment to a more passive role in the economy while maintaining direct controls over wages and possibly job decisions.

Commander, Coricelli, and Stachr focus on the implications for wage bargaining and policy of inherited ownership arrangements and rules about wage setting during the transition.

In imposing unemployment on the system, by repudiating the soft budget constraint, the reforming government tries to teach workers and managers that behind it all lies a Phillips curve. But fiscal and political constraints limit the government's tolerance (if not stimulation) of unemployment — so agents may be skeptical about government adherence to announced policy.

Commander, Coricelli, and Stachr discuss the strong tendency toward overemployment and wage drift in socialist systems. They focus on the market-based transitional economy, exemplified by Poland since 1990, setting up a series of models capturing the behavior of worker-controlled firms.

They develop a simple policy game in which government policy is conditioned on output, through a subsidy instrument. This reflects the

problem typically faced by reforming governments of whether to enforce a hard budget constraint (and hence tolerate higher unemployment) or whether to resort to subsidies and associated departures from fiscal targets.

Given the commitment to privatization and the consequent uncertainty about future claims on capital, they also develop — in a two-period model — the conditions under which the worker-controlled firms will deplete capital stock, possibly through excessive wage growth. They indicate how an appropriate tax rule — in this case, a wage-per-worker rule — can restrain decapitalization. They also discuss the possible utility of contingent claims on capital — such as vouchers — in offsetting capital depletion promoted by uncertainty about property rights.

Finally, they emphasize the way wage tax rules can affect employment and wages and how critical is their design. A wage bill tax, as used in Poland through 1990, not only reduces employment but will probably raise wages. By contrast, a wage-per-worker tax will tend to raise employment and lower wages. These effects are likely to be reinforced in a two-sector context, where worker-controlled firms and private firms coexist and where relative wage considerations are important.

They conclude that because of the inherited ownership structure and the uncertainty associated with reform, market-based regimes will continue to need centralized controls over wages in worker-controlled firms (the socialized sector). Unemployment and an expanding private sector alone are unlikely to provide a sufficient restraining mechanism for wages.

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by
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Section 1 Introduction

The scale of the reform agenda in the erstwhile socialist economies and the complementary nature of policy changes makes the ordering of reforms peculiarly complex. Yet it is not difficult to understand that certain basic features of the inherited system -- the presence ex ante of socialized ownership, full employment, restricted labor mobility and de facto wage indexation -- necessarily imply that drastic reforms in the labor market area must feature prominently and at an early stage in any viable reform program. To a certain extent, this is not a matter of choice. The question turns rather on ensuring the compatibility of interventions over particular time horizons.

Reforming governments characteristically seek to establish a commitment to prudent macroeconomic policies, amongst which restrictive fiscal targets figure prominently. Achieving these targets in turn will reflect their ability to enforce hard budget constraints on the socialized enterprises and thereby simultaneously tolerate unemployment. However, to the extent that it is believed that structural features will promote myopic or short run behavior on the part of workers and managers, the government is faced with the task of balancing its desire for demonstrating its commitment to a more passive role in the economy with maintenance of direct controls over wages and possibly employment decisions.

This paper concentrates on the implications of those inherited wage setting rules and ownership arrangements for wage bargaining and policy in the transition. Several tensions in the system are given prominence. In the first place, wage and employment decisions have to be set in a context of a departure from full employment and where any trade-off between wages and employment is only partially or perversely perceived by agents. In effect, by imposing unemployment on the system through repudiation of the soft budget constraint, the reforming government attempts to teach workers and managers that behind it all lies a Phillips curve. Yet while this implies initial tolerance, if not stimulation, of unemployment on the part of the government, fiscal and political constraints will tend to place bounds on this tolerance,

possibly leading agents to believe that adherence to announced policy will be weakened and loosening of stabilization measures pursued.

Second, the extent of worker participation or influence in management decisions requires appropriate analytical treatment when tracing the likely outcomes of bargaining between government and firms and in wage bargaining within the firm. In so far as the firm is worker managed, this tends to give rise to a joint maximization problem over wages and employment. It also has important implications for the likely wage and employment outcome once uncertainty over ownership rights is introduced.

Third, the government faces a dilemma with regard to its wage policy. On the one hand, given low wage dispersion and inadequate relative returns to skills, wage controls can tend to dilute incentives for firms to expand while also conserving a sub-optimal wage structure. However, if the structure of current ownership is conducive to capital depletion and maximization of labor rents, as is commonly asserted¹, a centralized wage policy would be critical for restraining inflationary pressures, avoiding a lower capital stock and ultimately lower aggregate employment, as well as the emergence of classical unemployment derived from excessive real wage claims. In this light, the appropriate question concerns the design of the wage policy, its incidence and degree of permanence.

The paper is organized as follows. In Section 2 we provide a summary discussion of the main features of wage setting in types of socialist economies. These initial conditions are shown to be critical in shaping the labor market policies of a reforming government moving to a market-based system. We draw on recent Polish experience since January 1990 highlighting the behavior of wages and employment during the initial phase of the stabilization program. In Section 3 we set up our basic model of a worker controlled firm (WCF) and develop a one period policy game between the government and the WCF. Section 4 discusses the implications of a number of simple tax rules for the WCF's wage and employment decisions. Section 5

¹ For instance, by Hinde (1990); Lipton and Sachs (1990).

explicitly accounts for uncertainty over ownership rights and models this in a two period context. We indicate some possible means by which decapitalization of the firm can be avoided.

Section 2 Wage Determination under Socialism

In this section, we lay out the range of initial conditions from which more accelerated episodes of reforms have commenced. We focus on the wage setting framework and outline in very stylized form the manner in which wage bargaining arose in these systems. For clarity of exposition, a simple distinction between three types of regimes -- the centrally planned economy (CPE); the partially reformed socialist economy (PRE) and a market-based economy -- is drawn.²

2.1 Centrally Planned and Partially Reformed Regimes

In the case of the CPE and the PRE certain common features hold. Full employment is a given. Excess aggregate demand for labour predominates alongside selective labor shortages. Further, there is no evident association between output and prices with no endogenous mechanism of equilibration in the system. Prices are largely administered and explicitly follow a cost-plus routine. The full employment regimes tend also to be associated with low mobility exacerbated by infrastructural constraints, particularly housing.³ In both systems, wage levels tended to be low with minimal dispersion, thereby distorting the intertemporal accumulation of skills. Labour allocation and sorting largely occurs independently of prices.

It would seem reasonable to assume that in the controlled economy wages could be considered exogenous. This is incorrect.⁴ In the CPE world of vertical controls and exhaustion of labor reserves, the planner generally had

² For example, Bulgaria could be classified as a CPE until 1990; Hungary and Poland up to 1989 could be classified as partially reformed regimes and Poland, the former GDR and possibly Hungary since 1990 as market-based regimes.

³ Mayo and Stein (1988) indicate housing and labor market linkages in the case of Poland.

⁴ A fuller discussion is contained in Commander and Staehr (1990).

recourse to piece rates to motivate workers and to circumvent the monitoring problem. Managers of enterprises were effectively transmission belts and lacked autonomy in negotiating wages. The wage-bill of enterprises, comprising base wages plus piece rate adjustments, was the control variable employed by the planner.⁵

In the more decentralized world of the PRE vertical controls were relaxed and greater autonomy to enterprises and managers was granted. In Hungary and Poland this was also associated with the transformation of the majority of enterprises into management by workers' councils. Wages were generally explicitly associated with productivity or profitability indicators.

Decentralization opened up a number of tensions with regard to wage policy. Enterprises faced distorted prices complicating simple association of warranted wage growth to profitability or productivity indicators. Soft budget constraints and the redistribution of profits through the budget generated perverse incentives for enterprises and generally subverted the association between the wage distribution and plant or industry-level performance.⁶ The absence of a hard budget constraint and the explicit use of cost-plus pricing required that the government continued to regulate wages through centrally given norms to avoid wage drift and cost-side inflationary pressures. Average wages in the dominant socialized sector remained characterized by low dispersion.⁷ In both CPE and PRE regimes social cash and kind transfers and subsidies further tended to equalize gross household income and net personal income. In Hungary, for example, where social income expanded to around 49% of total household income for the period 1980-1990, the

⁵ Adam (1979) contains a detailed discussion.

⁶ Kertesi and Cukor (1987) show that in Hungary short run tensions in goods markets and with respect to enterprise performance have guided wage policy.

⁷ Note, however, that the gap between private and public sector wages tended to expand. See, for example, Falus-Szikra (1986).

Gini coefficient for gross household income at the end of the period fell from 0.29 for main wage earnings to 0.23 when including social income and taxes.⁸

The emergence of more complex bargaining behavior in the PRE turned around the interaction between managers, workers and government. Enterprise managers' were motivated through bonus payments associating their wages with performance or synthetic indicators. By imposing an appropriate incentive structure the government hoped to engage workers and managers in a cooperative bargain over wages and effort. For the most part, this structure was given through tax policy conditioned on the wage, either on the level or, at times, on the rate of growth.⁹ Wages paid out above an announced norm were taxed by the government. Most commonly a tax (t) was levied on that share of the wage bill above the warranted amount (w^a). This implied in terms of cost per employee;

$$w + t(w - w^a), \quad \text{for } w > w^a$$

This tax formula would have only been fiscally neutral if a rebate or subsidy per employee had been offered.¹⁰ A rebate or subsidy was obviously not applied in the full employment regime as an explicit objective of tax based wage policy was to motivate labour shedding by enterprises.

Experience with applying an exogenous incentive structure and regulating wage development by tax based wage policies was very mixed and generally disappointing. In general, it would be appropriate to see workers and managers playing cooperatively against the government. Non-cooperative settings invariably prevailed when, as in Poland, there was no underlying agreement over the distribution of resources in the economy. While the broad

⁸ The difference for personal net income with and without social income was 0.18 and 0.23. See World Bank (1991).

⁹ A bewildering range of wage tax formulas have been applied; for further details, see Adam (1979); IMF (1989a and 1989b).

¹⁰ A rebate, such as $rw = t(w - w^a)$, would have set the cost per worker at; $w + t(w - w^a) - rw$, thereby being neutral with regard to employment.

rule appears to have been an indexation of wages to prices, the ability to enforce wage norms through tax policy varied widely."

2.2 The Market-Based Regime: Poland 1990/91

Central to the regime change is the tolerance of unemployment and the gradual emergence of a Phillips curve. Additionally, labor allocation is meant to be largely market driven within the constraints imposed by limitations on mobility and plant-specific non-wage benefits. Partial wage liberalization is likely to occur. In this section, we concentrate on the recent Polish stabilization experience focussing on the way in which wages are determined once unemployment is tolerated and the government signals a repudiation of the soft budget constraint and accommodating monetary policy.

The broad features of the Polish stabilization program are covered elsewhere ¹². In this context, it suffices to underline the use of wages, together with the exchange rate, as nominal anchor to the stabilization in the context of a radical trade opening and the associated, if incomplete, importation of a new relative price structure.

Wages were controlled at the outset of the program to arrest the development of a price-wage spiral. In the first four months wages could be adjusted in relation to inflation by a coefficient significantly lower than one, except for July. ¹³ Centralized control on wages was carried over and justified mainly in terms of dampening inflation given the ownership structure, uncertainty over the scale of restructuring and the cost-plus pricing routine followed by producers.

The outcome of the program in its first year can be summarized.

¹¹ For Hungary and Poland, see Commander and Coricelli (1991).

¹² Lipton and Sachs (1990); Coricelli and Rocha (1990)

¹³ The initially weak indexation coefficient and the low exchange rate delivered a very low wage level with an average daily wage of under US\$4.

- Real wages fell by 31% over the full year ¹⁴;
- Output in the socialized sector fell by 25%;
- Employment fell much less than output and therefore productivity dropped by about 20 percent;
- Unemployment rose from almost zero to over 6% of the labor force on a rising trend.
- Inflation was 250% over the year, with a monthly rate of 6% by early 1991.
- Sizeable budget and trade surpluses were generated.

The first year has been characterized by stagnation of output and persistent inflation. Real wages proved to be highly flexible downward in response to the initial shock to the economy, while employment dropped only marginally in the first two months of 1990 despite a steep decline in output. After March real wages began to increase while employment continued to decline. As a result, in the second half of 1990 one can observe a rapid increase in real wages together with a rapid increase in unemployment.

Overall, the behavior of wages, employment and productivity during 1990 seems to have reflected more a generalized recession than a shake-out of the economy associated with structural reforms. Indeed, output dropped in every sector of the economy.

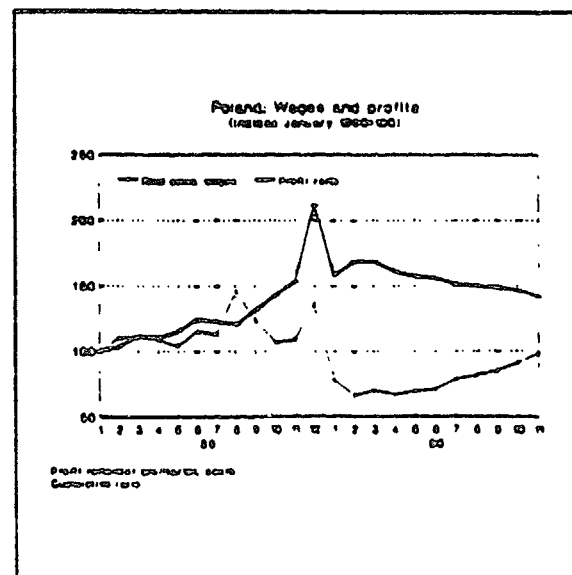
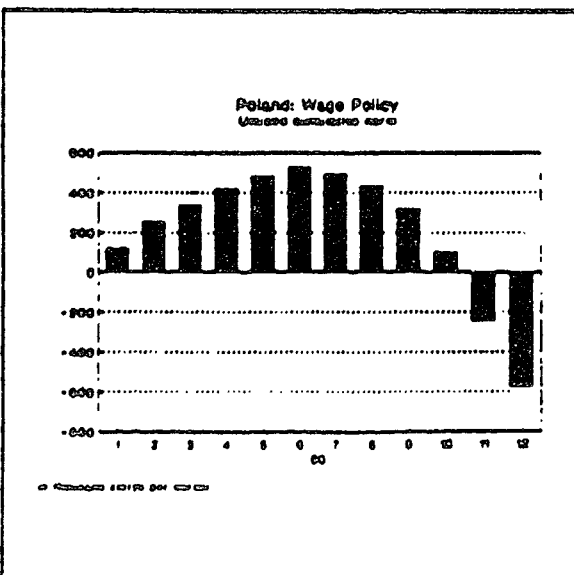
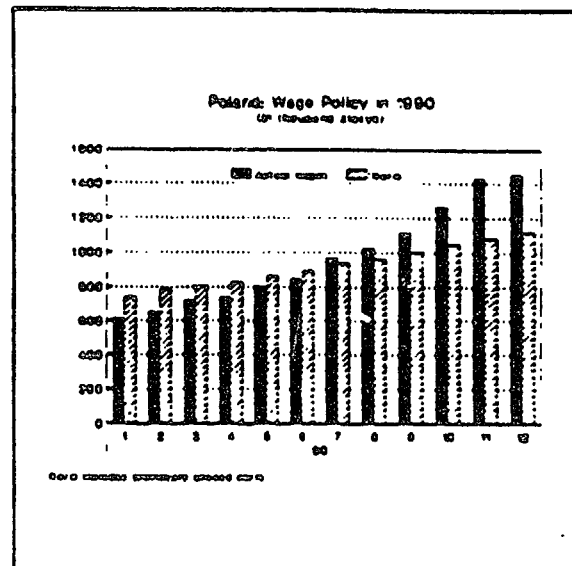
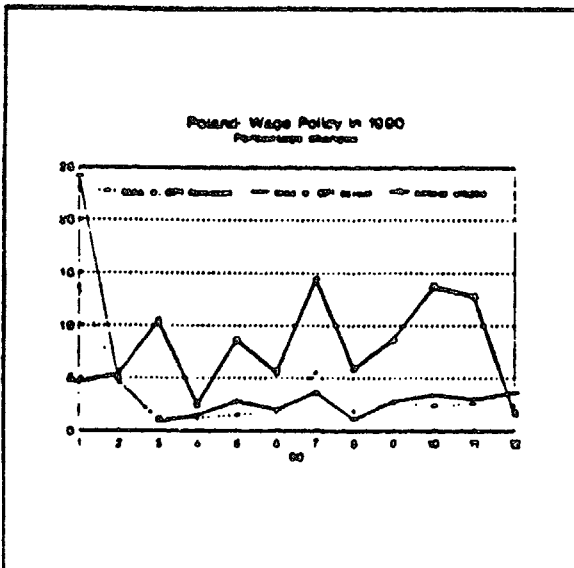
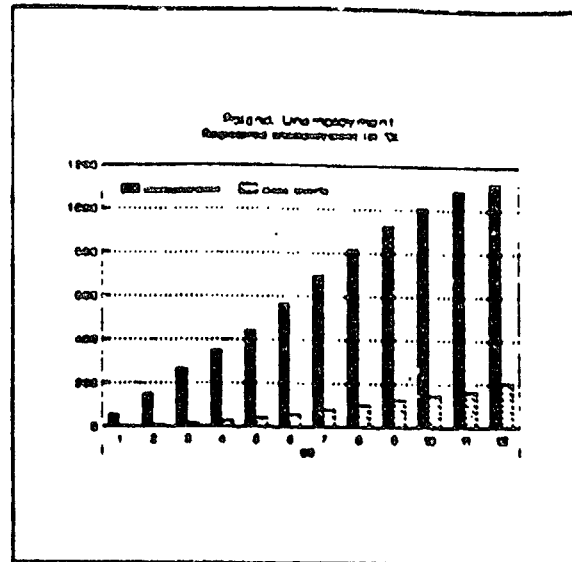
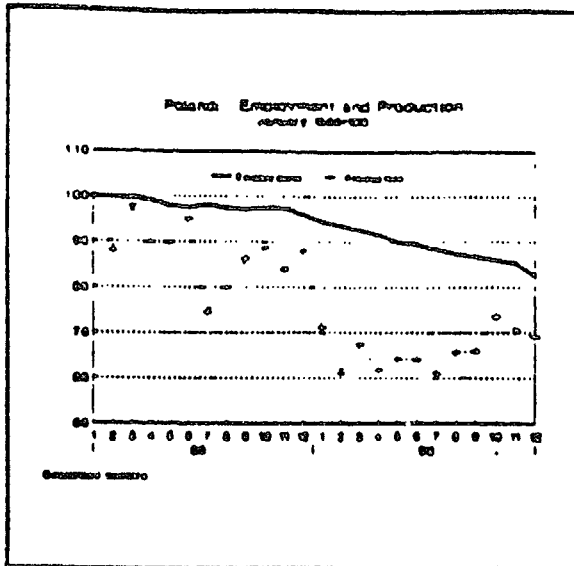
2.3 Unemployment

The rise in unemployment, though substantial and significantly more rapid than in other reforming economies ¹⁵, was not associated with a single bankruptcy in 1990, even though mass layoffs increased in the latter part of the year and accounted for roughly a third of cumulative unemployment over the

¹⁴ Measurement is complicated when comparing with the shortage regime of 1989 and the fall in the inflation tax on households over this period. It is also not clear what has happened to non-wage components of income; traditionally a large share of household income.

¹⁵ In Hungary unemployment moved from under 0.4% in January 1990 to around 2% of the labor force in January 1991 and is projected to reach between 3.5-4.5% by the end of 1991.

Figure 1



year.¹⁶ It is important to note that the fall in output in the socialized sector (25 percent) exceeded the drop in employment (14 percent), implying not only a fall in productivity but likely continuing overmanning.

Sectoral data consistently show output falling more than employment (see Table 2.1). Moreover, the variability of output across sectors (measured by the coefficient of variation in Table 2.1) was twice as large as that of employment. Overall, the dominant strategy appears to have been to reduce output rather than employment.¹⁷ Flows into unemployment have consequently to be further related to new entrants, some possible labor supply effects and the inducement to register as unemployed created by a fairly generous replacement ratio.¹⁸

2.4 Wages and Wage Policy

The sharp and programmed fall in economy-wide real wages disguises a rather more complex set of developments. First, after March 1990 real consumer and producer wages rose significantly, falling again only in December (Figure 1). By November real wages were barely 20% below the average for 1989 and above the level in January 1989; not taking into account differences in effective purchasing power over these periods due to the elimination of shortages. Second, wages and profits moved inversely following March (Figure 1). Sectoral data (Table 2.1) do however show profits and wages moving together but this can largely be ascribed to price changes rather than productivity growth. Product wages exhibit far greater variance than

¹⁶ Note that for most branches profit margins increased in 1990 as output declined. The stronger than expected profit performance of the socialized sector can generally account for the absence of bankruptcies. See Coricelli, de la Calle, Pinto (1990).

¹⁷ Layoffs have been concentrated in a number of sub-sectors; principally, retail trade, construction, transportation, engineering and coal.

¹⁸ The benefits scheme is of indefinite duration with a 70% replacement ratio at the start falling to 40% after nine months. There is however no indexation above a 30% floor. In Hungary the gross replacement ratio similarly ranges from 70% unindexed at the outset to 40% by the end of the second year. Claims can only be made for up to two years.

Table 2.1

Poland: Sectoral data, January-December 1990 1/

Jan-Dec. 1989=100

	Employment	Productivity	Production	Producer Prices	Real Profits	Product wage	Consumer wage	Nominal wages
COAL	91.80	78.00	71.60	1,078.3	42.1	46.8	63.4	441.3
FUEL	99.70	78.74	78.50	1,190.8	168.1	52.0	75.8	527.9
POWER	101.80	88.41	90.00	1,272.1	313.8	46.9	68.7	478.1
FERROUS METALLURGY	94.40	88.03	83.10	1,098.1	117.9	55.2	74.7	519.6
NON-FERROUS METALLURGY	97.20	78.50	76.30	1,090.6	113.7	51.3	72.9	507.6
METAL PRODUCTS	90.60	79.25	71.80	836.5	75.6	64.3	67.5	470.0
ENGINEERING	89.20	90.36	80.60	781.8	76.2	69.4	68.5	476.7
PRECISION INSTRUMENTS	89.70	92.73	83.20	650.1	60.8	80.9	65.7	457.1
TRANSPORT EQUIPMENT	91.50	80.77	73.90	885.0	70.4	63.8	68.7	477.9
EL-TECH ENG. & ELECTRONICS	92.00	85.54	78.70	734.6	57.4	70.9	65.5	456.0
CHEMICAL INDUSTRY	93.90	80.19	75.30	938.9	80.6	59.1	68.2	474.7
BUILDING MATERIALS	93.20	82.40	76.80	892.1	91.9	60.6	67.6	470.8
GLASS & GLASS PRODUCTS	94.60	76.53	72.40	873.0	58.3	62.5	67.0	466.2
POTTERY & CHINA	97.00	76.39	74.10	734.1	51.7	72.4	66.8	465.0
WOOD & WOOD PRODUCTS	89.80	84.19	75.60	730.7	35.4	73.9	66.0	459.6
PAPER & PAPER PRODUCTS	92.30	83.75	77.30	949.8	70.5	58.8	67.7	471.1
TEXTILE PRODUCTS	88.90	66.93	59.50	638.1	21.3	78.0	61.8	429.8
WEARING APPAREL	89.20	77.80	69.40	496.8	27.4	97.7	62.1	431.9
LEATHER PRODUCTS	90.10	73.58	66.30	565.3	17.6	84.6	60.3	419.8
FOOD INDUSTRY	98.20	75.66	74.30	727.6	52.0	82.2	66.0	459.2
Unweighted averages	93.26	80.89	75.44	858.2	80.0	66.5	67.2	468.0
Std. deviation	3.70	6.03	6.33	204.62	63.98	13.46	3.85	26.82
Cooff. of variation, in %	3.96	7.45	8.39	23.84	79.94	20.21	5.73	5.73

1/ Due to unavailability of data on producer prices by sectors for December 1990, the product wage refers to January-November.

consumption wages. Real wages also exhibit greater variance across sectors than employment.

Throughout 1990 wages were contrally regulated, except for private sector wages. The mechanism of enforcement was a tax on wage bill increases in excess of levels given by the monthly coefficient or norm (n). The norm was inflation in a given month times a coefficient usually less than one.¹⁹ The wage bill tax took the following form:

$$t(w_n - w_{n-1}n_{n-1}(1+n))$$

with a very steep progressivity in tax rates.

Designed in this way the tax was not neutral vis-a-vis employment nor vis-a-vis the composition of the labor force within an enterprise. The monthly indexation rule also imparted inertia to the inflationary process. A particular feature of the scheme was the ability of enterprises to carry over wages from month to month when actual wage payments fell below the norm. Actual wages fell below the norm in the first six months of the program. Thereafter the accumulated surplus was drawn down with wages consistently exceeding the norm. Only in November and December were accumulated wage norms exceeded, resulting in substantial tax penalties being incurred by enterprises. In this regard, wages barely anchored the stabilization at all, save at the end of the year.

The factors behind stronger wage growth in the second half of 1990 are difficult to pin down. The relative buoyancy of profit margins and some relaxation of credit policy in the third quarter of 1990 suggest some ability to pay on the part of enterprises.²⁰ At the same time, it would be logical to assume that workers would test the government's resolve to hold down wages, particularly given the relatively gradual increase in unemployment. The fact that firms were willing to pay taxes on excess wage increases, at rates above

¹⁹ The coefficient was 0.3 in January, 0.2 between February and April, 0.6 in May and June, 1 in July and 0.6 thereafter.

²⁰ However, positive interest rates would have acted to limit credit financed wage increases. A simple chain of causality between money and wages is not obvious.

100 percent, supports this argument. In principle, the tax on the wage bill might explain the phenomenon of raising real wages and declining employment during the second half of 1990.

For 1991 the wage tax has been modified. First, to eliminate the pro-unemployment bias and constraints on expanding firms, the average wage rather than the wage bill is subject to regulation. Second, a monthly indexation scheme has been retained.²¹ Third, wage expansion has been explicitly associated with the enterprise profit ratio. Fourth, private firms can set wages free of government regulation, while firms that are about to be privatized -- 'commercialized entities' -- are partially exempted from excess wage taxation.²²

By linking permissible wage growth to a firm's profit ratio (nominal profits plus wages over wages) the new policy has the clear disadvantage of allowing wage growth to depend on the price that the enterprise can charge.²³ This can be an invitation to exploit market power, particularly if it is believed that workers will attempt to maximize short term wage growth.²⁴ Additionally, a monthly indexation arrangement retains inertia and ensures that the system remains very sensitive to price shocks. This is particularly problematic in the Polish context still subject to large temporary shocks to inflation -- such as the increase in administrative prices in January 1991. An alternative approach would be to lengthen the indexation period but this would obviously depend on the government's ability to enforce a longer constant wage ceiling.

In common with heterodox stabilization experiences elsewhere wage restraint in Poland was fairly effective at the outset of the program.²⁵ The

²¹ A 0.6 indexation coefficient for January 1991.

²² There is an obvious adverse selection problem here.

²³ The tax formula being: $t((\pi_t + w_t/w_t) / (\pi_{t-1} + w_{t-1}/w_{t-1}))$

²⁴ In theory, monopolies are excluded but whether this will be enforceable is another matter.

²⁵ For experience elsewhere, see Riguel and Liviatan (1989).

problems start when controls are weakened or made more flexible. These problems are more acute for former socialist economies precisely because of the ownership structure and worker participation in decision making. This structure has further implications for whether centralized wage control policies can be seen as short term devices to restrain cost-push inflationary pressures or are likely to respond over a more protracted period to the institutional particularities of such regimes. ²⁶

Section 3 Wage and Employment Decisions in the Worker Controlled Firm

We start from the stylized institutional features of a market-based regime. There is a dominant socialized sector in which workers' councils control the firm and whose interference in management is non-trivial. Henceforth, we refer to such firms as worker controlled (WCF).

3.1 The Worker-Controlled Firm

The implications of active participation of workers in management have been extensively explored elsewhere, particularly in the Yugoslav context ²⁷. Labour managed firms have been widely characterized as maximizing income per worker rather than profits, so that the value of the marginal product of labour does not equate the wage rate but rather income per worker ²⁸. If this was the case, it could readily be shown that employment would be lower, that there would be a tendency to substitute capital for labour and that there would be an inverse relationship between price and output changes. However, the robustness of these results has been questioned. For instance, distinguishing over short and long run membership can generate a positive short run output supply curve ²⁹. Further, in a static setting optimal employment, given by the employment equating the marginal revenue product of

²⁶ Layard (1991) discusses these points in rather more detail.

²⁷ See, inter alia, Brewer and Browning (1982); Vanek (1970); Ward (1958)

²⁸ $\max r = (pY - (\sum p_i i + f)) / L$ rather than $\max \pi = pY - (wL + \sum p_i i + f)$ where r = income per worker; Y = output; i = inputs; f = fixed costs; L = number of workers.

²⁹ Miyazaki and Neary (1983) show this to hold except over a range of very low prices where the fixed cost burden implied by membership size is too severe.

labour with the lowest-paid worker member, can be shown to deviate relatively mildly from employment in a conventional profit maximizing firm³⁰. Empirical work has also emphasized the importance of exogenously given rules and policies.³¹

Our objectives are more restrictive. We assume -- at least initially -- that the WCF operates in a market environment. There is, however, uncertainty as to consistency in government behaviour, particularly with regard to enforcing a hard budget constraint on firms. Moreover, there is uncertainty over ownership and the degree to which WCFs will be carried over into future periods. These issues are explored further in Sections 3.2. and 3.3. For our purposes, worker control can be handled as equivalent to a powerful trade union presence where wages and employment are subject to joint maximization.³² In contrast with the classical labour managed firm, the WCF also cares about employment and accordingly maximizes the expected utility of the representative worker in the firm. Assuming further that there is a random selection of workers among those that are laid off and that they subsequently receive unemployment benefit, this allows us to view the WCF as a limit case for an efficient bargain model of the type commonly implemented for capitalist firms. However, in the WCF workers will be constrained by the firm's profit level and not directly by the labour demand curve and the wage will hence equate the average product of labour. The point on the contract curve that is picked will not result from bargaining, as in a conventional firm.

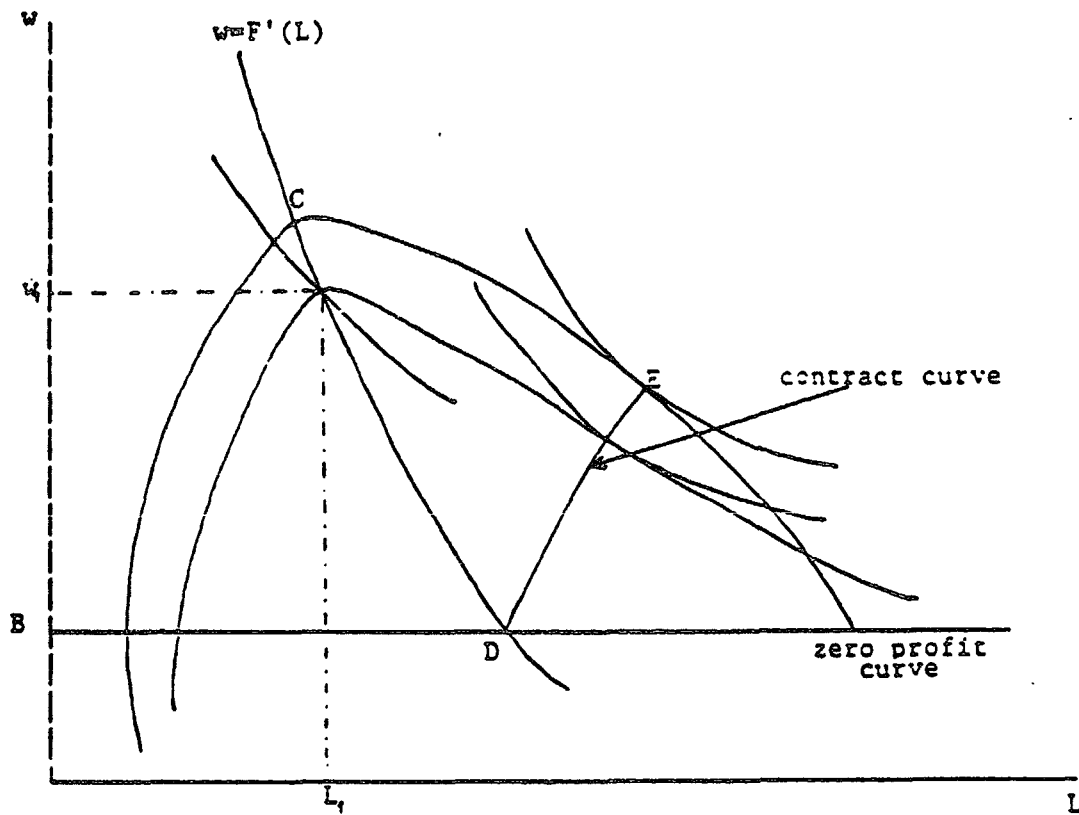
We assume that the workers maximize the expected utility of a representative worker over prospects of employment at the contract wage as against unemployment with a fall-back income. The latter is given by

³⁰ Spinnewyn and Svejnar (1990), who also emphasize the importance of existing membership size in determining employment and the output response to a price increase.

³¹ Prasnikar and Svejnar (1990).

³² This contrasts with widely used right-to-manage or monopoly union models where the wage is either bargained or picked by the union and employment subsequently set unilaterally by the employer; the outcome lying on the labour demand curve. See Oswald (1985) for a summary of this literature.

Figure 3.1



unemployment benefits (B). All current workers or members (M) receive equal treatment and those who will be eventually unemployed are randomly selected among members. The workers or union's utility function is;

$$U_u = L/M u(w) + (M-L)/M u(B) \quad \text{for } LSM \quad (3.1)$$

The production function $F(L)$ is assumed to have positive but decreasing returns ;

$$F'(L) > 0, F''(L) < 0 \text{ and } F(0) = 0$$

In the WCF, the union maximizes its utility (eq.3.2) with respect to wages and employment subject to a zero profit constraint ¹³;

$$\epsilon F(L) - wL = 0 \quad (3.2)$$

where ϵ is a price or productivity shock if the price is normalized to 1. We set M constant and equal to 1.

From the first order conditions we obtain;

$$(U(w) - U(B)) / U'(w) = w - F'(L) \quad (3.3)$$

and;

$$w = \epsilon F(L) / L \quad (3.4)$$

Eq. (3.3) is that for the contract curve, while eq. (3.4) gives the 'rent sharing' rule which, in the case of the WCF involves the workers appropriating all revenues.

Figure 3.1 is a standard diagram in wage-employment space contrasting the non-Pareto optimal outcome on the labour demand curve and efficient bargains given by the tangency of the firm's isoprofit curves and the workers or union's indifference curves. The locus of the points of tangency defines the contract curve. The isoprofit curves have a positive slope until the wage equates the marginal revenue product of employment, $F'(L)$. The lowest point on the labour demand curve, D, is the competitive equilibrium. This can be thought of as that point where the workers' have no bargaining power and where B is the supply price of labour or the reservation wage. The contract curve emanates from this point and slopes upward thereafter, given $w \geq w^0$ (the

¹³ The firm would fold below this level; in other words, the hard budget constraint binds.

competitive wage); $w \geq F'(L)$. Any point along the contract curve above D implies a wage above the marginal revenue product of labour. This illustrates the nature of the solution to "efficient bargaining." The solution is efficient for the firm and the given set of members; it is however inefficient from a social point of view as there is excessive employment. The model seems to accord well with the 'stylized' fact of overmanning and labor hoarding in socialist economies. The outer point E on the contract curve is that given by the tangency of the zero isoprofit curve and the workers' indifference curve. It can be seen as that point at which the workers' appropriate the maximum rent above the reservation wage subject to the slope of the zero isoprofit curve and thus the zero profit condition.

In the literature on market economies, the precise point on the contract curve is generally undetermined. Most authors have opted for a Nash-Zeuthen-Harsanyi solution to the bargaining problem. This maximizes the product of the gains from a contract subject to the respective bargaining powers and threat points of the parties to the contract.³⁴ The threat points and union size are given exogenously. Further assumptions are, that the threat point for profit earners is equal to zero, that profit earners are risk neutral and their utility linear in profits and that there is a representative worker.³⁵ In this setting, with $\epsilon=1$, the maximization over w and L , under the constraint that L is smaller than total membership, is as follows;

$$L[U(w)-U(B)][F(L)-wL] \quad (3.5)$$

From the first order conditions we obtain;

$$(U(w)-U(B))/U'(w) = w-F'(L) \quad (3.6)$$

$$w = (F(L)/L + F'(L))/2 \quad (3.7)$$

Eq. (3.6) gives the contract curve, while (3.7) indicates the specific point on the contract curve resulting from the solution to the Nash bargain. The latter takes the form of a sharing rule and means that under a cooperative

³⁴ This can be written as: $\text{Max} \{ [U_1 - U_1^0]^\alpha [U_2 - U_2^0]^{1-\alpha} \}$

³⁵ Aoki (1986) has an interesting discussion of these assumptions.

solution the wage would equal the mean of the marginal and average products of labour.³⁶ A more general formulation of the sharing rule, without assuming either a zero threat point for profit earners or risk neutrality, would be ³⁷;

$$w = 1/(1+\delta) (F'(L) + \delta F(L)/L) \quad (3.8)$$

with δ measuring the relative bargaining power of the union.

Raising the workers' bargaining power or threat point would obviously imply that average productivity will matter more than marginal productivity in the determination of the wage. In the case of the WCF, going to the zero profit point on the contract curve will be equivalent to setting wages and employment on the average revenue product of labour curve.³⁸

Figure 3.2 illustrates the wage-employment outcome associated with eq. (3.8).³⁹ Wages in the WCF will be on the average product of labour curve at a point such as D. The classical labour managed firm, which does not care about employment, will set wages at E, that point giving the maximum feasible wage per worker. A competitive firm will set wages equal to the reservation wage, B. Employment will be on the labour demand curve, $F'(L)$, for the labour managed firm and the competitive firm, but this will not be so for the WCF. For the latter, wages will be above those for the competitive firm, but lower than for the classical labour managed firm. The highest employment level is associated with the WCF.

We can now trace through the likely implications for the wage and employment of various shocks. Two types of shocks have been studied in the

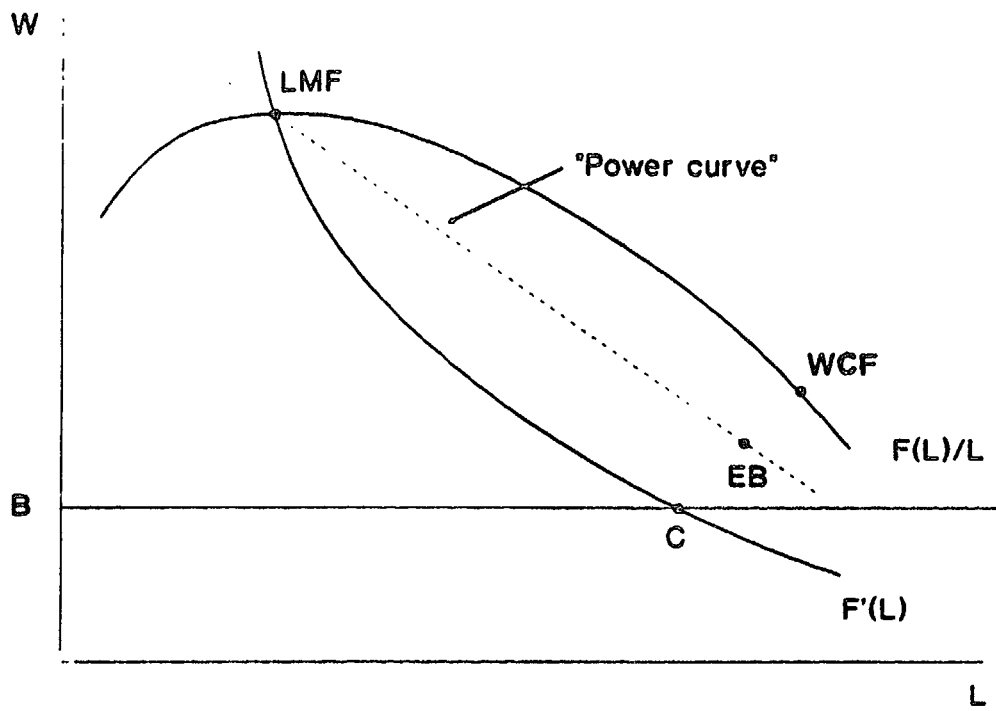
³⁶ The sharing rule is generated by the cooperative setting and by the assumption of risk neutrality. Note also that the average revenue product curve is downward sloping so that the bargained outcome is at the intersection of the upward sloping efficiency locus and a downward sloping locus reflecting bargaining strength (McDonald and Solow, 1981)

³⁷ Following Aoki (1986).

³⁸ Precisely because of the institutional arrangement, one can also note that the problem of the firm reneging ex post on the employment associated with this outcome and moving back to the marginal revenue product curve is not an issue.

³⁹ Figure 3.2 is adapted from Aoki (1986).

Fig 32



context of the present model.⁴⁰ One involves a shock to the labour market, such as an increase in unemployment benefits, the other a change in goods markets, such as an adverse demand shock. A productivity shock will be equivalent to the demand shock. An increase in unemployment benefits will shift the contract curve up to the left. This clearly implies that at any level of employment wages on the new contract curve will be higher. An adverse product market shock would also induce a shift to the left (north-west) of the contract curve, implying a lower level of employment at any given wage. With risk neutral workers (i.e. a linear utility function) real wages are independent from product market shocks. Wages would thus be rigid in the face of changed product market conditions. If labour and goods market shocks occur simultaneously -- as is the case in Polish-type stabilization programmes -- employment will decline, while the effect on wages will be unclear. Introducing considerations of membership size obviously modifies the result and would generally make wages flexible. In particular, if current members discount the future, the prospect of unemployment next period motivates a real wage fall.

Having set out the basic model, we now provide a series of extensions that explicitly associate the response of the WCF to government policy and policy instruments, particularly subsidies and tax-based wage rules.

3.2 A Simple Policy Game

In much of the existing policy game literature it is worth noting that the choice of raising output above the natural rate can generally be attributed to labour market rigidities. However, in the transitional economy, no player knows where the natural rate lies -- there is a learning process underway -- and a simple model in which inflation and output enter the utility function and where the economic causality and tradeoffs are obvious has little

⁴⁰ McDonald and Solow (1981).

to offer ⁴¹. Structural change and the 'noise' associated with that change obscure conventional, emerging relationships. At the same time, political and institutional complexities make modelling more difficult.

In the reforming economy, the government starts necessarily with low credibility. Agents not only are uncertain with regard to the characteristics of the government but also have imperfect information regarding exogenous shocks to the system.⁴² If credibility is a state variable that is time dependent the larger the departure from steady state values at the outset, the larger and possibly more protracted the likely demonstration effect. This can partially explain why a reforming government may wish to super-correct first period -- actually prefer output losses -- with the size of that correction testifying to the policy maker's adherence to announced goals ⁴³.

It is clear that to acquire credibility a reforming government of the Polish variety has to convince agents that it is in effect a wolf but not in sheep's clothing. In particular, the government seeks to impose a hard budget constraint on producers and hence will not resort to deficit finance. The government deals with organized labour via a trade union or worker-managers.⁴⁴ It seeks to shock enterprise managers and workers into behaving like true profit-maximizers. It may choose to use tolerance of bankruptcy as an instrument for demonstrating its resolve. It will correspondingly accept that unemployment is above any implicit target level.⁴⁵ Agents will seek however

⁴¹ Such as a Barro-Gordon set-up with output given by $y = y_0 + (x - x^0)$ and a government one period function; $u_t(x, x^0) = -x^2 + \alpha(y - y_0)$, $\alpha > 0$
 $-x^2 + \alpha(x - x^0)$

⁴² Note that if the policy maker has no superior information regarding exogenous shocks then a rule-based approach could merely impart greater rigidity to the system.

⁴³ See Vickers (1986) for a discussion of separating and pooling equilibria in a two period model.

⁴⁴ The union and/or worker-managers could also be seen as being concerned with their credibility as bargainers on the part of workers; especially given the general legacy of subservience to Party and State.

⁴⁵ This does not necessarily imply that the government accepts output as being above the target level as it may hold that there is such over-manning in the economy that productivity gains can rapidly swamp employment losses.

to test the government's tolerance of output and employment losses and, implicitly, its ability to enforce a hard budget constraint on firms. Such discontinuity in preference could be seen as recourse to stabilization policy and would hence give rise to discontinuity in the indifference curves of the union. This motivates the use of subsidies as a policy or stabilization instrument in Section 3.3 below.

This tension is evident once a fiscal policy target is introduced. That target encompasses the hard budget constraint in so far as subsidies to firms to cover operating losses directly show up in the budget. Moreover, we can assume that unemployment benefit is paid to workers and is financed through the budget. Thus, fiscal balance depends on enforcing the hard budget constraint while enforcing the hard budget constraint implies increased unemployment and hence a call on budgetary resources for financing the unemployment system. We allude to this tension below.

3.3 A single period policy game

We now motivate a simple game in non-cooperative and cooperative settings over the minimum time period in which a policy rule can be applied. We present solutions with Nash and Stackelberg equilibria. We assume a closed economy with WCFs and a government. Individual workers are risk neutral, $u(W)=W$. Union membership is constant and set equal to 1. No taxes are levied. The WCF maximizes the utility function in eq. (3.9) subject to the zero profit constraint in eq. (3.10) with respect to employment and wages.

$$U_u = LW + S - LS \quad (3.9)$$

$$F(L) - WL + S = 0 \quad (3.10)$$

The only difference from the basic model of Section 3.1 is that subsidies (S) now enter the zero profit constraint. Subsidies are positively associated with employment and/or the wage.

The government has the following simple utility function;

$$U_g = L - \beta S, \quad \beta \geq 0 \quad (3.11)$$

The parameter β represents the government's trade-off between employment and paying subsidies. ⁴⁶ A high β implies that the government is strongly averse to departures from fiscal balance. We assume that the government adopts the following rule for the payment of subsidies:

$$S = sF(L), \quad s \geq 0 \quad (3.12)$$

The government is assumed to condition its policy on output so that subsidies are paid as a fraction of firms' output.⁴⁷

At this stage, unemployment benefits, B , are assumed exogenous and the total payment of benefits $(1-L)B$ does not enter the government's utility function.⁴⁸

Finally, we use a Cobb-Douglas production function with decreasing returns to scale. We write $F(L)$ as:

$$F(L) = AL^a, \quad \text{where } A > 0, \text{ and } 0 < a < 1 \quad (3.13)$$

The Nash equilibrium

The WCF maximizes its utility taking the government's choice of s as given. Consequently, eq. (3.9) is maximized with respect to W and L subject to the eq. (3.10) and the subsidy rule in eq. (3.12). The firm's reaction curve is:⁴⁹

$$W = B/a \quad (3.14)$$

The union's choice of employment as a function of the subsidy parameter is given by eq. (3.15), where an increased subsidy parameter, s , will always be associated with increased employment.

$$L = [(1+s)Aa/B]^{1/(1-a)} \quad (3.15)$$

⁴⁶ Only positive subsidies are considered. Note that this implies the fiscal trade-off alluded to above.

⁴⁷ Relating subsidies to employment, the wage-bill or an amount independent of W , L or $F(L)$ would not markedly alter the results.

⁴⁸ We will later consider what happens if the payment of unemployment benefits enter the government's utility function.

⁴⁹ Calculations are available from the authors.

The government knows the zero profit constraint of the LCF but in this setting can only influence employment, taking wages as given.³⁰ The government's reaction curve is hence found by maximizing its utility in eq. (3.12) with respect to s , subject to the subsidy rule in eq. (3.13) and the zero profit constraint (eq. (3.11)). The government reacts to a given W by the choice of s implicitly given by eq. (3.16) below:

$$W = \frac{1+s}{\beta(1-a+s)} \quad (3.16)$$

In (s, W) space the government's reaction curve will be downward sloping since $dW/ds < 0$. The government's choice of s as a function of the employment level is implicitly given by eq. (3.17) below.

$$L = [\beta A(1-a+s)]^{1/(1-a)} \quad (3.17)$$

If $a/B < \beta \leq 1/(1-a)(a/B)$ there exists a unique Nash equilibrium (with $s \geq 0$) which is stable. That equilibrium implies a subsidy parameter s^{NE} , an employment level L^{NE} , and a wage W^{NE} :

$$s^{NE} = (a - \beta(1-a)B) / (\beta B - a) = a^2 / (\beta B - a) - (1-a)$$

$$L^{NE} = [\beta A a^2 / (\beta B - a)]^{1/(1-a)}$$

$$W^{NE} = B/a$$

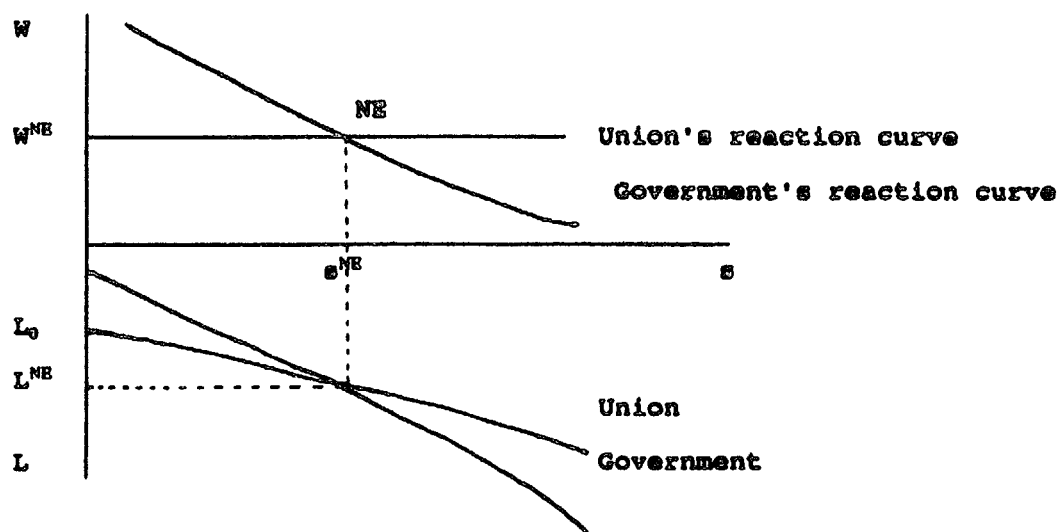
$s > 0$ implies payment of positive subsidies to the firm; a soft budget constraint.³¹ The employment in the NE (L^{NE}) is greater than if no subsidies are paid (L_0), viz; $L^{NE} \geq L_0$. The wage is B/a since the union's choice of wage does not depend on the subsidy parameter. An increase in β lowers both s^{NE} and L^{NE} . Emphasizing fiscal balance will be associated with lower subsidies and employment.

These points are graphically presented in Figure 3.2.

³⁰ This is somewhat ad hoc. One justification could be the government conditioning subsidy policy on output, hence employment. In the later Stackelberg setting with government as leader, wages are no longer taken as given.

³¹ $s = 0$ for $\beta = 1/(1-a)(a/B)$.

Figure 3.2



The intersection between the reaction curves in the upper panel is the Nash equilibrium. Subsidies are on the horizontal and wages on the vertical axis. In the lower panel the curves show the optimal relationship between employment and the subsidy parameter for, respectively, the union (eq. (3.15)) and the government (eq. (3.17)). The intersection between these curves represents the subsidy parameter and employment for the Nash equilibrium. An increase of β will lead to a horizontal shift of the government's reaction curve to the left (and likewise for the curve for eq. (3.17)) and hence lead to lower employment.

The Stackelberg equilibrium with the government as the leader ²²

We now assume that the government sets its subsidy parameter before the WCF sets the wage and employment. The government acts as a Stackelberg leader maximizing its utility taking into account the firm's reaction to its policy s .

If $1/B < \beta \leq 1/(1-a)(1/B)$, subsidy parameter s^* , employment L^* and wages W^* are similar in this Stackelberg equilibrium to the solutions for the Nash equilibrium. This can be grasped from Figure 3.2. The Stackelberg

²² Calculations for both Stackelberg settings are available on request from the authors.

equilibrium is obtained where an indifference curve is tangent to the firm's reaction curve. This point can be seen to be where the government's and the firm's reaction curves intersect.

The Stackelberg equilibrium with the WCF as the leader

In this case the WCF is assumed to move first taking into account the reactions of the government. The firm maximizes its utility with respect to L and W subject to the zero profit constraint and subject to the subsidy rule in eq. (3.12), and subject to the government's reaction curve (eq. (3.16) or eq. (3.17)). If $1/B < \beta < [a^2/(1-a)+1](1/B)$ a Stackelberg equilibrium with $s \geq 0$ exists and is unique. Denoting the subsidy parameter, the employment and the wage for the Stackelberg equilibrium where the WCF is the leader s^S , L^S , and W^S we have:

$$s^S = a^2/(\beta B - 1) - (1-a)$$

$$L^S = [\beta A a^2/(\beta B - 1)]^{1/(1-a)}$$

$$W^S = B$$

The subsidy and employment parameters are bigger than for the Nash equilibrium. This occurs because the firm effectively endogenizes the government policy rule and hence the willingness to pay subsidies conditioned on output. The wage W^S is however lower than for the Nash equilibrium; a function of the downward sloping government reaction curve. Hence while subsidies and employment increase, the firm will also accept a lower wage.

3.4 Concluding comments

The above results hold for non-cooperative settings. A Nash bargaining solution with equal bargaining powers delivers subsidy and employment parameters higher than in any of the non-cooperative settings. Wages are found to lie somewhere between the Stackelberg equilibrium with the firm as leader and the Nash equilibrium.³³

The very simple policy game presented in this section obviously suffers from not explicitly entering a cost term directly into the government

³³ Detailed results are available from the authors.

function. A more elaborate treatment, along the lines pursued by Driffill (1985), would be to incorporate a social welfare function in which a cost term, associated with departures from fiscal balance, would figure.³⁴ A more tractable way of presenting the problem in the light of the present model would be to incorporate any negative utility attaching to the government from payment of unemployment benefits. This is obviously a more restrictive approach. Writing unemployment benefits $(1-L)B$ the government's utility function now reads;

$$U_g = L - \beta[S + (1-L)B], \quad \beta \geq 0 \quad (3.18)$$

Collecting terms, dividing through with $(\beta B + 1)$ and defining $U_g/(\beta B + 1)$ as U_g' :

$$U_g' = L - \beta/(\beta B + 1)S - \beta B/(\beta B + 1) \quad (3.19)$$

We see that the parameter in front of S has decreased compared to the utility function in eq.(3.11). The obvious intuition is that if the government has a willingness to pay unemployment benefits this will be associated with a lower weight on budget balance and this is likely to imply a higher subsidy parameter. It does not of course capture any of the more complex offsetting effects.

The policy game developed above has clear limitations. Nevertheless, it seeks to formalize a basic dilemma for transitional governments; the trade-off between employment and subsidies, where subsidies are in effect continuation of the soft budget constraint. A cooperative solution can be shown to yield relatively low wages but high employment and hence high subsidies. Both the Nash equilibrium and the Stackelberg setting with the government as leader, will deliver higher wages than the cooperative setting, with employment and subsidies lower. When the WCF is the Stackelberg leader it perceives the government rule and endogenizes policy when optimizing. In effect the WCF optimizes against a steeper employment/subsidy curve. Higher employment and subsidies result with a lower wage than for the Nash Equilibrium and government Stackelberg settings. Expressed simply, if the WCF understands

³⁴ For example a social welfare function; $v = -(L-L)^2 - \alpha D^2$ where the second captures the costs of fiscal imbalance.

that the government cares about employment (despite possible announcements to the contrary) this will result in the government offering subsidies to firms and hence bailing them out. Such subsidies permit higher than warranted employment. It is clear -- but here inadequately developed -- that the fiscal costs can be non-trivial. By being unable to implement a hard budget constraint on the WCFs, the credibility of the reform program -- and hence the signalling of a regime break -- would be undermined.

Section 4: Tax Rules and the Worker Controlled Firm

We have already alluded to the widespread use of tax-based incomes policies in partially reformed socialist economies. Their use can be traced to a multiplicity of objectives. These include; restraint on the appropriation of labor rents; regulation of firm level labor demand and regulation of effective demand. To the extent that the market-based economy lacks fully endogenized restraints on pricing and ownership remains largely socialized, tax-based incomes policies retain relevance, as recent Polish experience testifies.

In this section we provide a very summary treatment of tax rules and indicate the likely differing outcomes with respect to employment and wages. We work with the model discussed in section 3. For simplicity, we assume individual workers are risk neutral. The tax enters directly into the zero profit constraint;

$$P(L) - WL - T = 0 \quad (4.1)$$

We consider the following four tax rules ⁴⁵:

- (i) Wage-bill tax, where the tax is levied on that share of the wage bill (WL) above a preannounced norm. Ω represents the norm so that; $T = t[WL - \Omega]$, when $WL \geq \Omega \geq 0$. This type of tax was widely used in the PRE setting and in Poland in 1990 (see Section 2),
- (ii) Wage per worker tax, where wages in excess of a norm (w) are taxed so that: $T = tL(W - w)$, when $W \geq w \geq 0$,

⁴⁵ More complicated rules -- such as those incorporating value-added or productivity -- are ignored.

(iii) Production tax; $T = t[F(L) - y]$, when $F(L) \geq y \geq 0$ and where y is the norm or threshold level,

(iv) A lump sum tax, equal to a constant; $T = t$.

In Table 4.1 we derive the multipliers from the WCF's maximization subject to the zero profit constraint and the particular tax rule.³⁶ Note that the tax parameters are taken as exogenous by the WCF in this arrangement. We distinguish between the tax rule itself and a parameter for the tax norm or threshold. The multipliers in brackets are for specific functional form for the production function, namely a semi-Cobb-Douglas³⁷; those outside of brackets relate to a generic production function with decreasing returns to scale.³⁸

Several results stand out. A wage bill tax and a production tax have exactly similar effects and clearly result in lower employment and a likely increase of wages. This equivalence is useful to illustrate the negative supply-side implications of the wage-bill tax. This tax rule effectively motivates firms to shed labor; not necessarily a desirable component for a market-based reform economy. Change in the taxable norm (Ω and y) proves neutral vis-a-vis employment but wages unambiguously increase with an increase in Ω or y .

For the tax per worker, by contrast, an increase in the tax rate clearly lowers wages and raises employment. An increase in the norm (ω) leads to higher employment but the impact on wages is ambiguous. This tax rule clearly has an employment bias; in sharp contrast to the wage bill. It can be noted that so long as the wage ceiling is above the reservation wage or unemployment benefit, an increase in the ceiling will stimulate employment and reduce wages.

³⁶ Detailed calculations available from the authors.

³⁷ viz; $F(L) = AL^a$, where $A > 0$, and $0 < a < 1$.

³⁸ $F(0) = 0$, $F'(L) > 0$, $F''(L) < 0$.

Finally, a lump sum tax merely lowers the wage and is neutral for employment. Note that a lump-sum tax is equivalent to a fixed cost, which has been widely studied in the literature on labor managed firms. It is also a negative subsidy, and can thus be interpreted in connection with the reduction of subsidies which accompanies the shift to a market-based system. Our model indicates that an increase in any type of fixed costs, such as the reduction of subsidies that is a feature of the shift to a market-based system, will lower wages without affecting employment.

Table 4.1: Effect of tax rules on wages and employment

	Effect of increase of parameter t on:		Effect of increase in norm on:	
	employm.	wages	employm.	wages
Wage-bill tax	- (-)	? (+)	0 (0)	+ (+)
Wage per worker	? (?)	? (?)	+ (+)	? (-)
Production tax	- (-)	? (+)	0 (0)	+ (+)
Lump sum tax	0 (0)	- (-)	na	na

Section 5 Ownership Reform and Decapitalisation

There is a well rehearsed set of arguments as to why socialized firms tend to be subject to decapitalization. These run as follows. Workers can only enjoy the benefits of capital if they work in the enterprises where that capital is employed. An absent capital market dilutes the longer-term interest of workers in the firm. Both features will tend to favour an appropriation of those benefits into current earnings. Wage pressure in the system will consequently be severe, subject only to the effectiveness of external restraints, such as tax policy and rules regarding reinvestment.⁵⁹ Those rules will tend not to bind in more decentralized settings.

⁵⁹ Hinds (1990) forcefully presents this line of argument.

While this stylization is extreme and the degree to which market-based restraints are endogenized in the firm will depend on a wide range of factors ^a, it is obvious that introducing uncertainty over ownership, through an announced strategy of privatisation, could possibly accelerate capital depletion in the transition. If firms are worker controlled and a certain proportion could expect to be privatised next period ^a, hence losing access to capital given by the prior ownership form, this might motivate consumption of capital in the current period. By contrast, capital depletion this period would have negative implications for a firm that remained worker controlled next period. From society's point of view, a lower capital stock next period can validate a lower level of employment; hence a possible source of hysteresis. The policy objective is then to reconcile the desire for ownership reform (and the knowledge that this cannot be done overnight) with measures to restrict lowering the capital stock as a function of the uncertainty imparted by prospective ownership reform. We examine this issue in relation to use of tax policy and also the possible use of vouchers as a means of restricting decapitalization. The overall problem can be couched accessibly in terms of an intertemporal maximization, building upon the basic model developed in Section 3.1.

5.1 A two period model with the worker controlled firm

We extend our basic model for the WCF (Section 3.1) in a two period case using a production function with labour and capital as arguments. Risk neutrality for individual workers is assumed. In period 1 the firm is a WCF, while ownership in period 2 is uncertain. We assume that the firm continues as a WCF with the probability, q , while being privatized has the probability, $(1-q)$.^a Throughout lower case subscripts denote the period, $i = 1, 2$.

^a See Blinder, et al (1990); Praanikar, et al (1990).

^a Privatisation could take the form of divestiture or simple closure.

^a More precisely, q is the union's point estimate of the firm being a WCF in period 2.

3.2 The firm is worker controlled

If the firm is worker controlled the union's utility function is as follows;

$$U_1^{WCF} = L_1 W_1 + B_1 - L_1 B_1 \quad (5.1)$$

The production function is similar in both periods and includes capital (K_i) as well as labour. We also include an exogenous productivity shock ($\theta_i > 0$);

$$\theta_i F(L_i, K_i), \quad i = 1, 2$$

We assume positive but decreasing marginal returns. For simplicity we assume no depreciation of capital. The firm can sell (and buy) capital at the start of each period at the price p_i , $i = 1, 2$ and the WCF has to decide at the start of each period how much capital to sell (or buy) and how much to allocate to production. The WCF pays taxes to the government amounting to T_i , $i = 1, 2$.

The WCF has initially at period 1 a capital stock K . It decides to use K_1 for production and sells the rest, worth $p_1(K - K_1)$. The zero profit constraint for period 1 can now be expressed as:

$$\theta_1 F(L_1, K_1) - L_1 W_1 + p_1(K - K_1) - T_1 = 0 \quad (5.2)$$

The zero profit constraint for period 2 when the firm is still worker controlled is:

$$\theta_2 F(L_2, K_2) - L_2 W_2 + p_2(K_1 - K_2) - T_2 = 0 \quad (5.3)$$

From expressions (5.2) and (5.3) it can be seen that the WCF cannot lend to, or borrow from, sources outside the firm.

Finally, we specify the tax rule as a wage per worker tax (see Section 4).

$$T_i = t_i L_i (W_i - \omega_i), \quad i = 1, 2 \quad (5.4)$$

3.3 The firm is privatized

If the firm is privatized new owners take over in period 2 and there is a regime change. We assume that the decisions taken by the workers in period 1 do not influence the utility of the union in period 2 if the firm is privatized. Further, if the firm is privatized it is not taxed. In the event of the firm being privatized in period 2 the exogenous utility level obtained is U_2^M .

5.4 The WCF's problem

The WCF maximizes its expected utility with respect to the instruments L_1, K_1, L_2, K_2 discounting the utility in period 2 with the discount factor $\delta, 0 < \delta \leq 1$.

$$\text{Max}_{L_1, K_1, L_2, K_2} \{ U_1^{\text{WCF}} + \delta((1-q)U_2^{\text{PR}} + qU_2^{\text{WCF}}) \}$$

The utility levels $U_i^{\text{WCF}}, i = 1, 2$ are found by inserting the tax rules eq. (5.4) into the zero profit constraints (eq. (5.2) and eq. (5.3)), isolating $W_i L_i$ and inserting these into the utility functions eq. (5.1).

The first order conditions with respect to L_1 and K_1 are:

$$\frac{1}{1+t_1} [\Theta_1 F_{L_1}(L_1, K_1) + t_1 \omega_1] - B_1 = 0 \quad (5.5)$$

$$\frac{1}{1+t_1} [\Theta_1 F_{K_1}(L_1, K_1) - p_1] + \frac{1}{1+t_2} \delta q p_2 = 0 \quad (5.6)$$

The interpretation of eq. (5.5) is that the union chooses an employment level and that amount of capital whereby the marginal utility of one extra employee equals B_1 , (the marginal utility of being unemployed). Eq. (5.6) says that L_1 and K_1 are chosen so that the marginal utility from keeping one more unit of capital (increased production and value of sales next period) equals the utility of selling that unit of capital this period.

5.5 Some Results

We analyze how the exogenous variables influence the amount of capital kept in production in the first period, L_1 and K_1 , where the bigger K_1 , the lower the extent of decapitalization. L_1 and K_1 are determined jointly by eq. (5.5) and eq. (5.6). Calculation of the multipliers yields the following results ^a;

$$dK_1/dq > 0 ; dK_1/d\delta > 0 ; dK_1/dp_1 < 0 ; dK_1/dp_2 > 0 ;$$

$$dK_1/d\theta_1 > 0 ; dK_1/d\theta_2 = 0$$

^a Detailed calculations are available from the authors.

As expected, the higher the probability of the firm remaining worker controlled (q) in period 2, the lower the extent of decapitalization. Likewise, greater discounting (δ) by the WCF and a higher price of capital in period 2 give positive multipliers. So does a positive productivity shock (θ_1) through the higher value of capital stock in period 1. A productivity shock in period 2 is neutral. By contrast, if the price of capital in period 1 is high this reverses the sign, indicating that the WCF will sell capital in period 1 and hence decapitalize the firm.

3.6 Tax policy

We now consider how a tax rule can be implemented so as to limit any incipient decapitalization. We insert a wage per worker tax where taxation falls on wages above a certain norm; $W_1 > w_1$. Distinguishing, as in Section 4, between the tax parameter (t) and the tax norm or threshold (w), the following multipliers can be derived;

$$dK_1/dt_1 > 0 ; \text{ if } w_1 > B_1$$

$$dK_2/dt_2 < 0 ; dK_2/dw_1 > 0 ; dK_2/dw_2 = 0$$

Using this tax rule it emerges that a sufficiently high tax parameter can arrest decapitalization in period 1 but that a higher tax rate in period 2 will promote decapitalization. This is a result of a substitution effect making it more favorable to be paid wages in period 1 than in period 2. Note also that a uniform tax increase for the two periods ($dt_1 = dt_2$) will reduce decapitalization, $dK_1/dt_1 + dK_1/dt_2 > 0$; if $w_1 > B_1$.

An increase of the wage norm in period 1 (w_1) increases retained capital while an increase in w_2 leaves K_1 unchanged. The reason for dK_1/dw_1 being positive is that the marginal utility of labour has increased. This implies higher employment and also a larger capital stock.

This section makes clear that using an appropriate tax rule -- in this case a wage per worker rule -- capital depletion can be restrained. However, this requires a somewhat differentiated tax stance across the two periods. An expected high tax parameter in period 2 will certainly promote capital depletion. The policy challenge is to apply a high tax parameter and wage

norm in period 1 relative to those applied in period 2. Clearly, the WCF will retain capital into period 2 only if it believes that it will not be subject to higher taxation that period.

5.7 Vouchers

Pursuing the line of argument developed above, we now consider whether introducing a contingent claim on a specified share of the value of capital of the WCF could induce modified behaviour by the WCF given uncertainty over ownership next period. We consider in particular the case of a voucher handed out to members of the WCF. The value of the voucher, V , is;

$V = \alpha p_2 K_1$ if firm privatized, 0 if firm still worker controlled.

α is a constant ($\alpha \geq 0$) expressing the fraction of the value of the capital represented by the voucher.

The utility of the union in the case where the firm is privatized can consequently be expressed as the following sum:

$$U_2^{PR+V} = U_2^{PR} + \alpha p_2 K_1,$$

where U_2^{PR} is the exogenous utility obtained in the absence of a voucher.

Assuming that the firm pays no taxes if it is privatized, the maximisation problem of the WCF can now be written as:

$$\text{Max}_{L_1, K_1, L_2, K_2} \{ U_1^{WCF} + \delta((1-q)U_2^{PR+V} + qU_2^{WCF}) \}$$

The first order conditions now contain a term for the value of the voucher:

$$\frac{1}{1+t_1} [\Theta_1 F_{L_1}(L_1, K_1) + t_1 w_1] - B_1 = 0 \quad (5.7)$$

$$\frac{1}{1+t_1} [\Theta_1 F_{K_1}(L_1, K_1) - p_1] + \delta(1-q)\alpha p_2 + \frac{1}{1+t_2} \delta q p_2 = 0 \quad (5.8)$$

From eq. (5.8) (the first order condition with respect to K_1) it can be seen that a voucher introduces an additional term with positive expected utility from retaining more capital in period 1.

Inserting the voucher results in dK_1/dq having an indeterminate sign. This comes about because although an expected gain for the WCF will result from being able to sell capital in period 2, this will be offset by an

expected loss from not being able to cash the voucher.⁶⁴ However, $dK_1/d\alpha > 0$, so that if the value of the voucher is increased more capital will be retained in the firm. ⁶⁵

5.8 Concluding comments

In this section we have explored an important issue for the reforming economy; can uncertainty over ownership and associated incentives for decapitalization be mitigated by applying an appropriate tax rule and/or offering a contingent claim on capital to members of the WCF? Given the announcement of impending privatization by reforming governments, a two period setting seems quite appropriate. The model has some obvious disadvantages. There is no expectation to price and the only uncertainty is with respect to privatization. Equally, we ignore any of the likely wealth effects -- and consequent macroeconomic implications -- let alone the transactions costs and the design issues associated with a voucher scheme. Nevertheless, it is evident that a suitable tax rule -- a tax per worker -- can dampen tendencies to capital depletion. This is an important point to the extent that it adjoins to the conclusions from Section 4 where the wage per worker rule can lead to lower wages and higher employment.

Section 6 Conclusion

We have attempted in this paper to draw out the implications of the ownership structure and, subsequently, uncertainty over that structure, for wage and employment setting in reforming socialist economies. We have indicated the strong tendencies to excessive employment and wage drift in these systems, in part consequent upon the ownership structure and the associated legacy of earlier regimes. Our primary focus has been on the

⁶⁴ If $\alpha=1/(1+t_1)$, the multiplier $dK_1/d\alpha = 0$, and the firm is indifferent over privatization or continuation as a WCF.

⁶⁵ If the value of the voucher equated the value of capital in the firm, then of course decapitalization in this setting would be rendered independent of the probability of privatization.

market-based economy, as exemplified by Poland since 1990. Surveying recent developments in Poland, although open unemployment has emerged to a significant degree, it is striking to note the continuing resistance to downward pressure on wages.

In the light of these stylized features, we then set up a series of models which focus on the behavior of the worker controlled firm. We develop a simple policy game where government policy is conditioned on output through a subsidy instrument. This reflects the characteristic problem faced by reforming governments of whether to enforce a hard budget constraint and hence tolerate higher unemployment or whether to resort to subsidies and associated departures from fiscal targets. We locate, in both cooperative and non-cooperative settings, the implications for wages, employment and subsidies.

Given the commitment to privatisation and the consequent uncertainty over future claims on capital, we also develop in a two period model the conditions under which the WCF will deplete its capital stock, possibly through excessive wage growth. We indicate how an appropriate tax rule -- in this case a wage per worker rule -- can restrain decapitalization. We also touch lightly on the possible utility of contingent claims on capital, such as vouchers, in offsetting capital depletion promoted by uncertainty over property rights.

Finally, we emphasize the way in which wage tax rules can affect employment and wages and how critical is their design. A wage bill tax, as used in Poland through 1990, not only lowers employment but will likely raise wages. By contrast, a wage per worker tax will tend to raise employment and lower wages. These effects are likely to be reinforced in a two-sector context where the WCF sector and private firms coexist and where relative wage

considerations are important.⁶⁶ The relevant wage for private sector workers might be the relative wage with respect to the WCF sector. As a consequence the wage set by the WCF will have direct implications for wages in the private sector. This reinforces the point that wage restraint in the WCF is likely to be critical. We therefore conclude that because of the inherited ownership structure and the uncertainty associated with reform, market-based regimes will continue to require centralized control over wages in the WCF or socialized sector. Unemployment and an expanding private sector alone is unlikely to provide a sufficient restraining mechanism for wages.

⁶⁶ We intend later to develop a two sector model incorporating efficiency wage setting in the private sector.

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